

AAAS ANNUAL MEETING: NEXT GENERATION COMPUTER HARDWARE

*Seattle, Washington
February 15th, 2020*

Mark D. Hill, Wisconsin & CCC, Moderator

Tom Conte, Georgia Tech & CCC

Todd Hylton, UCSD

Stan Williams, Texas A&M (withdrawn)



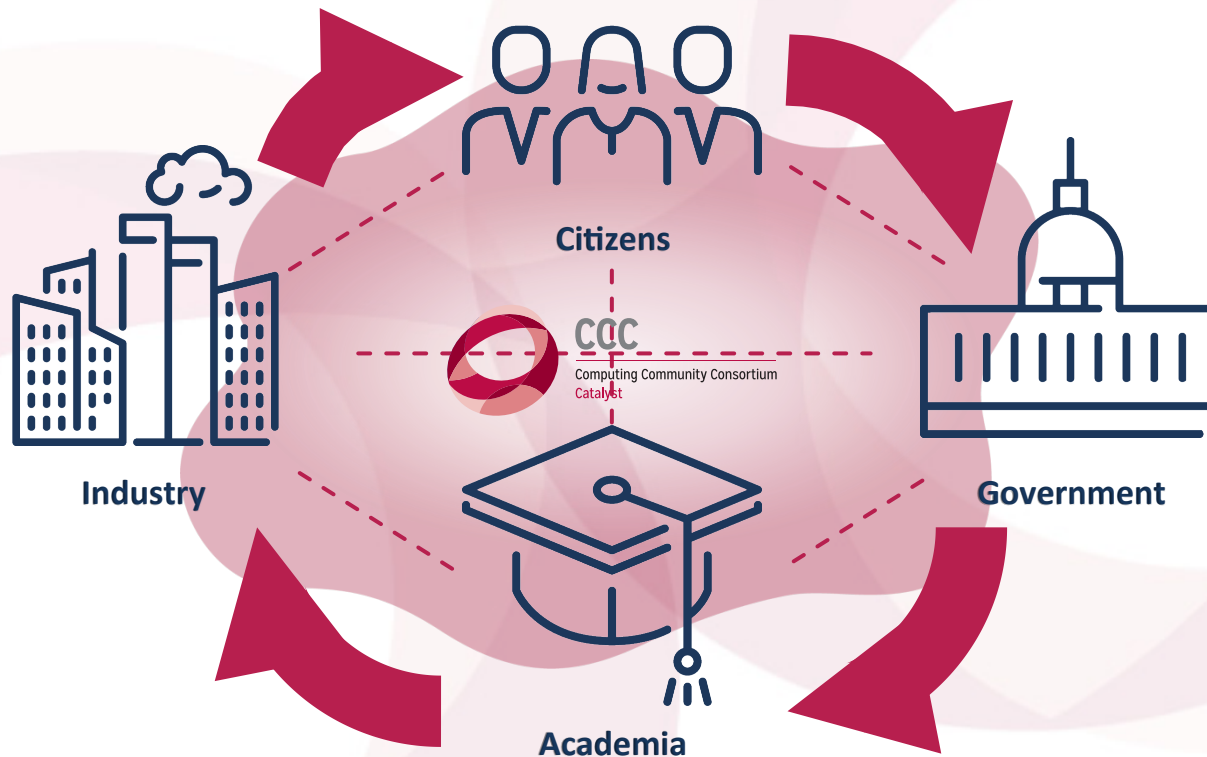
ADVANCING SCIENCE, SERVING SOCIETY



CCC

Computing Community Consortium
Catalyst

COMPUTING COMMUNITY CONSORTIUM (CCC): CATALYZING I.T.'S VIRTUOUS CYCLE



**Pre-competitive white papers & workshops
catalyzing I.T. research for the nation's benefit**



CCC

Computing Community Consortium
Catalyst

20th Century ICT Set Up

- Information & Communication Technology (ICT) Has Changed Our World
 - <long list omitted>
- Use a “stack” (next slide) to manage complexity
- Required innovations throughout “the stack,” including algorithms, applications, programming languages, ... , & system software

Computer Layers (or “Stack”)

Problem

Algorithm

Application

Middleware / Compiler

Operating System

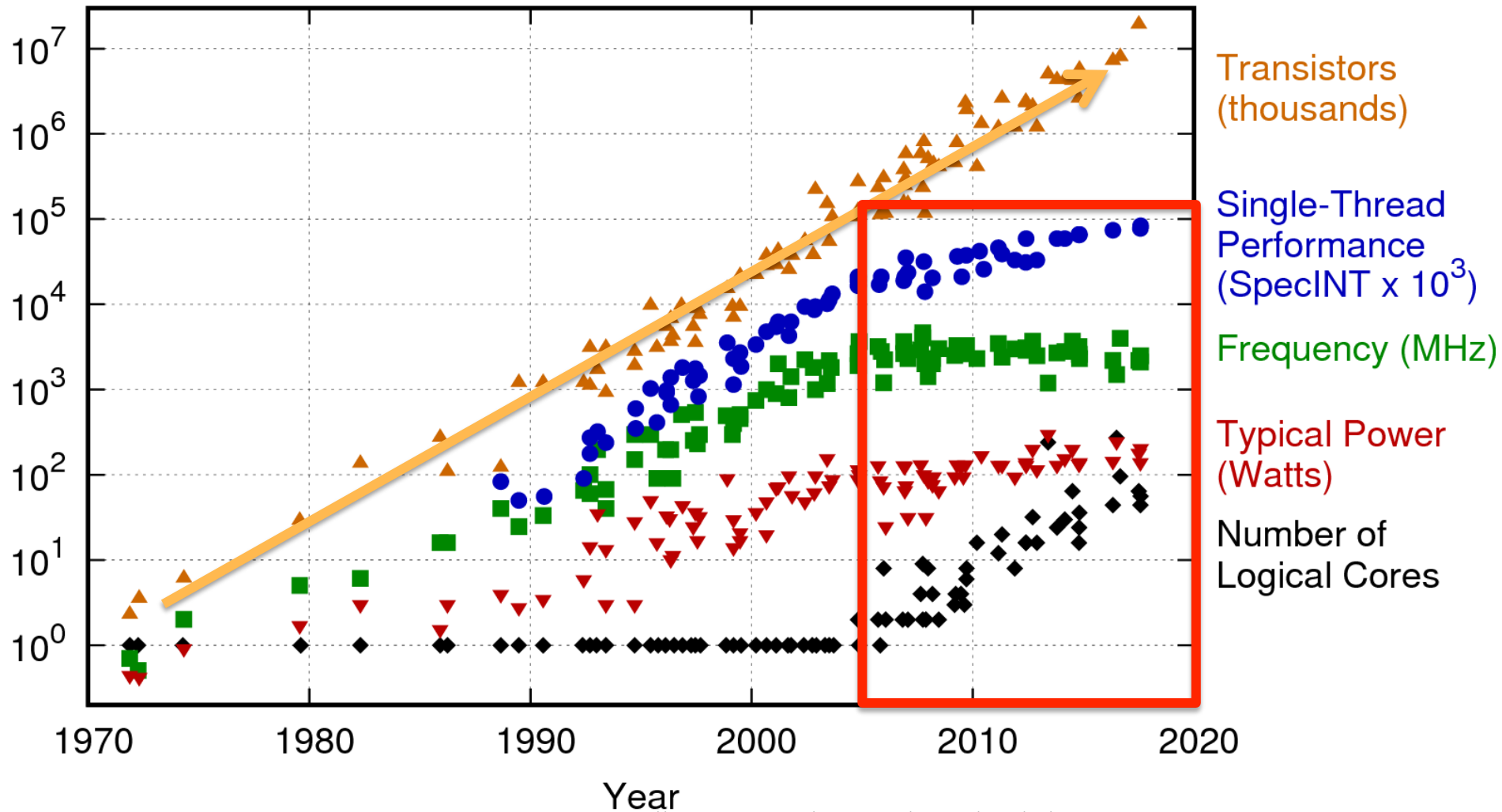
Software
Hardware

Microarchitecture

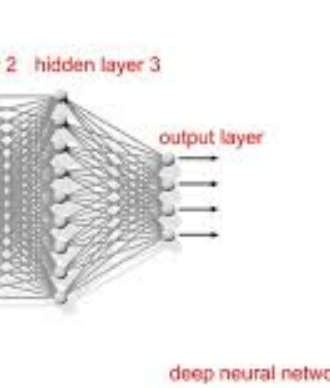
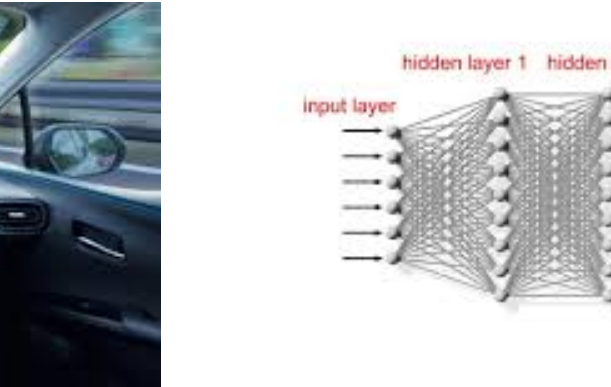
Logic Design

Transistors, etc.

42 Years of Microprocessor Trend Data

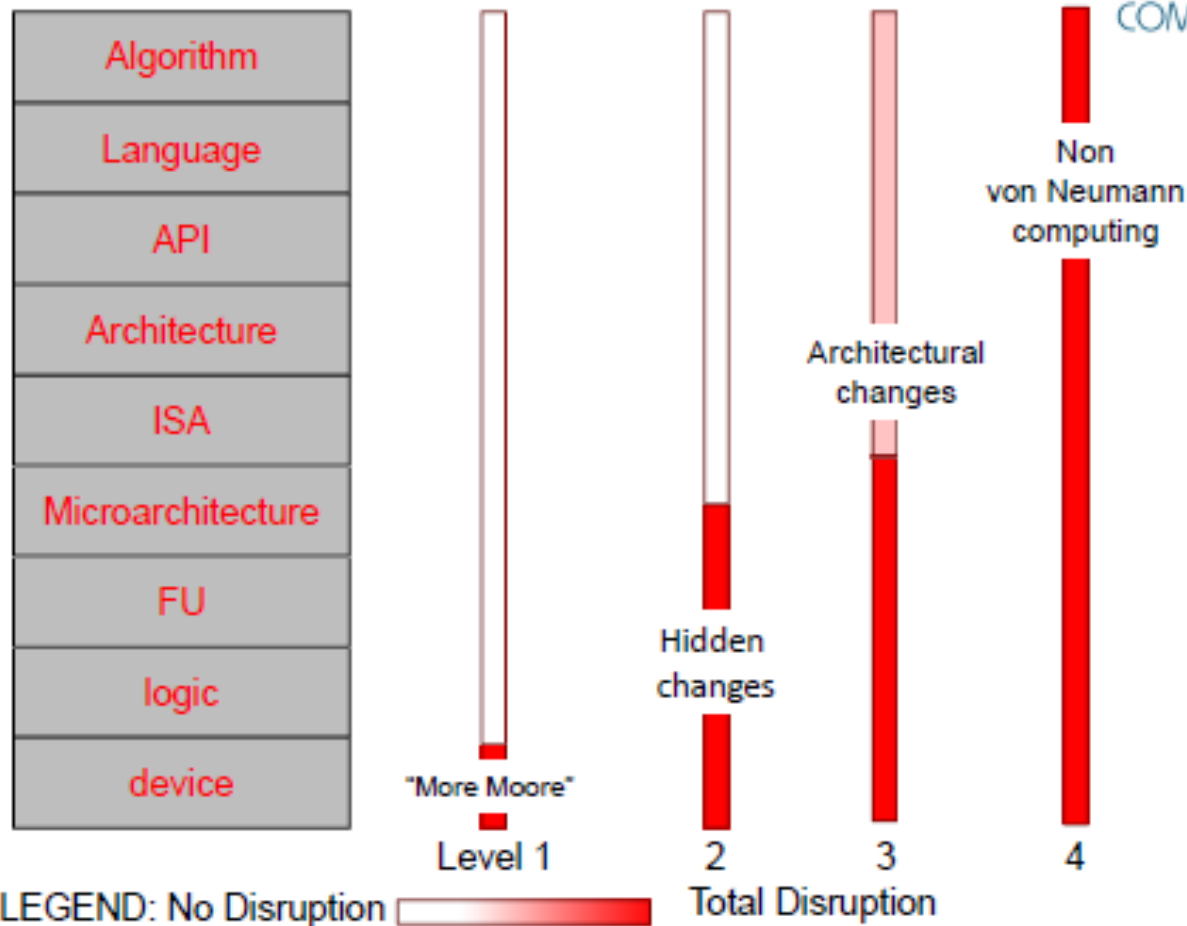


Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten
New plot and data collected for 2010-2017 by K. Rupp
<https://www.karlrupp.net/wp-content/uploads/2018/02/42-years-processor-trend.png>



NEXT GENERATION COMPUTER HARDWARE

Potential Approaches vs. Disruption in Computing Stack



Tom Conte

Georgia Tech



Into The Wild: Radically New Computing Methods for Science

- *Computer architecture & compilers, digital design, performance eval.*
- *2015 Pres. Inst of Electrical & Electronic Engineering (IEEE)*
- *Lead IEEE Rebooting Computing*
- *IEEE Fellow, Member CCC*
- *1998 PhD Illinois*

Todd Hylton

University of California, San Diego



The Future of Computing: It's All About Energy

- *Novel computing systems, e.g. for autonomous vehicles & robotics*
- *VP Brain Corp. (startup)*
- *2007-11 DARPA Program Manager for SyNAPSE & Physical Intelligence*
- *SAIC, 4Wave, & Commonwealth Sci.*
- *1991 PhD Stanford*